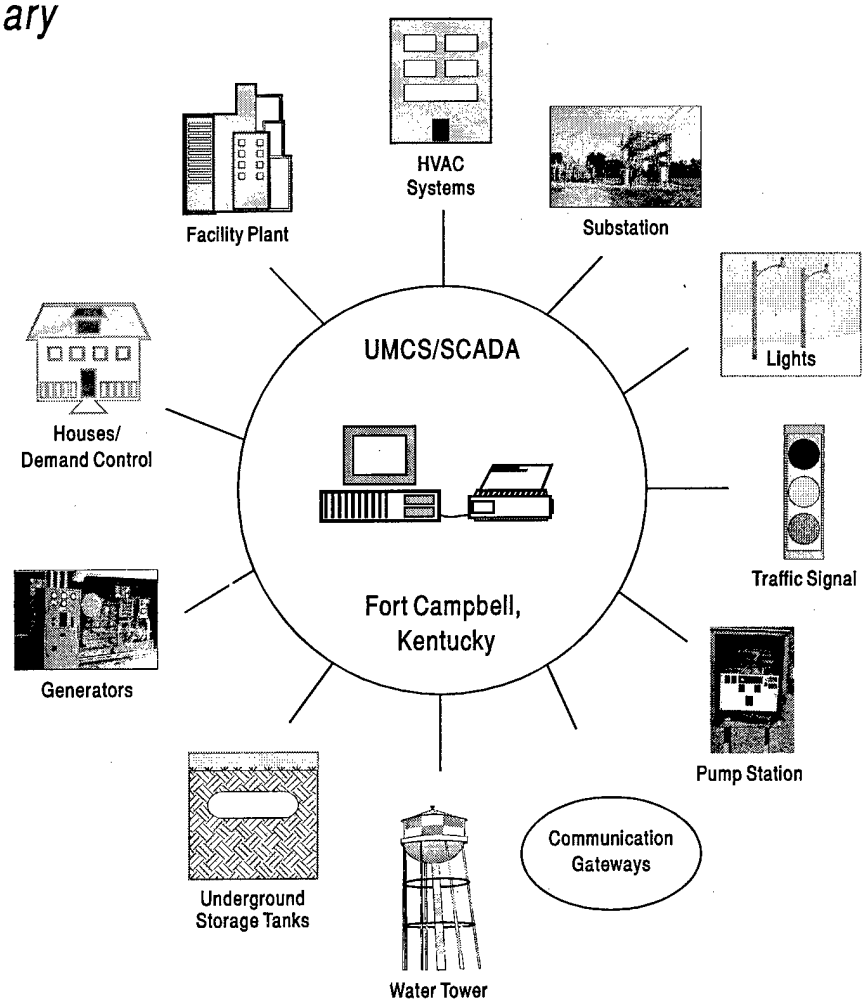
FEASIBILITY STUDY, FY95S EEAP
Utility Monitoring & Control System (UMCS)/ Supervisory Control and Data Acquisition (SCADA) System Fort Campbell, Kentucky

Executive Summary



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of Engineers

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LIST OF TABLES

1.1 SYNOPSIS

Systems Engineering and Management Corporation (Systems Corp) performed a feasibility study on the application of the Utility Monitoring and Control System (UMCS) at Fort Campbell, Kentucky for US Army Engineer District, Louisville, under Contract No. DACA01-94-D-0034, Delivery Order No. 0008. The study evaluated the economic benefits of monitoring and controlling various facility and utility systems at the Fort through the use of the UMCS.

The UMCS is a utility monitoring and control system that utilizes several computer stations with appropriate application software connected by communication network systems (wire, radio, power line carrier or fiber optics) to a number of remote terminal units placed at various locations to perform the following functions: collect data, perform remote and local controlling functions, initiate alarm conditions, and report the information through the communication network back to the computer stations.

The study resulted in a recommendation for the implementation of the Utility Monitoring and Control System at Fort Campbell under one project. The implementation of the UMCS project will save Fort Campbell $1,348,383 annually. The project will pay for itself in 3.65 years.

1.2 FEASIBILITY STUDY REQUIREMENT

The UMCS feasibility study evaluated the economic benefits of monitoring and controlling various facility and utility systems at Fort Campbell, Kentucky. Potential savings associated with the UMCS include energy savings, maintenance and operation labor cost savings, and cost avoidance due to equipment failures. The general requirements of the Scope of Work are listed below:

- Review for general information the available design, construction, documentation, and operation data for the existing EMCS (Energy Monitoring and Control System) and the existing facility and utility systems on Fort Campbell.

- Perform a feasibility survey and study of specific facility and utility systems in order to collect the necessary data for the evaluation and analysis of the UMCS applications and Energy Conservation Opportunities (ECOs).

- Evaluate UMCS application programs (software) for all facilities using similar data to determine the ECOs and economic feasibility for connection to the recommended new UMCS.

- Provide complete programming or implementation documentation for all recommended projects detailed herein.

- Prepare a comprehensive report to document work performed, the results, and recommendations.

1.3 FACILITY AND UTILITY SYSTEMS EVALUATED

The study evaluated the economic benefits of utilizing the UMCS/SCADA system to monitor and control Fort Campbell's facility and utility systems. Each system has an assigned ECO (Energy Conservation Opportunity) number. The facility and utility systems evaluated under this study are:

ECO 1: HVAC Systems
ECO 2: Electrical Substations
ECO 3: Emergency Generators
ECO 4: Water System
ECO 5: Sewage Treatment System
ECO 6: Remote Metering System
ECO 7: Underground Storage Tanks
ECO 8: Athletic-Field Lights
ECO 9: Traffic Signal Lights

1.3.1 Energy Costs

The costs for each type of energy source used in the study were obtained from the installation is utility bills and through the Defense Energy Information System (DEIS).

1.3.1.1 Electricity

Cost/kWh = $ 0.0211/KWH (No Demand)
Cost/kW = $ 11.78/kW
Cost/MBtu = $ 6.19/MBtu (No Demand)

1.3.1.2 Fuel Oil #2

Cost/MBtu = $5.62/MBtu

1.3.1.3 Natural Gas

Cost/MBtu = $4.35/MBtu (Summer Average)

1.4 SUMMARY OF ANALYSIS RESULTS

Life-cycle cost analyses were performed on each of the ECOs. The *Life-Cycle Costing in Design (LCCID)* computer program was used to performed the analysis. The study analyzed the potential savings and costs resulting from the implementation of the UMCS at Fort Campbell. The potential savings and costs data are input into the life-cycle analysis calculations. The results of the life-cycle analysis for each of the ECOs are shown in *Table 1.4.1*. *Table 1.4.2* shows the results of the life-cycle analysis for the overall project which incorporated all of the ECOs.

Table 1.4.1
UMCS/SCADA ECOs
LIFE-CYCLE COST ANALYSIS SUMMARY

ECO No.	Investment ($)	Energy Savings (MBtu)	Demand Savings ($)	Non-Energy Savings ($)	Non-Recurring		First Year Savings	Simple Payback	SIR
					Savings ($)	Yr OC			
1	$2,242,700	87,703	$19,551	$47,200	$1,104,655	5	$564,213	3.99	2.32
2	$1,099,014	0	0	$205,000	$120,000	5	$217,000	5.06	1.69
3	$420,119	(10,332)	$381,672	$74,146	0	0	$397,752	1.06	7.93
4	$68,970	0	$55,000	$14,600	0	0	$69,600	0.99	8.61
5	$225,500	0	0	$14,600	0	0	$14,600	15.45	0.55
6	$628,014	0	0	$24,408	0	0	$24,408	25.73	0.33
7	$30,152	0	0	$1,600	$18,700	5	$3,470	8.69	0.99
8	$52,201	243	$54,067	0	0	0	$55,571	0.94	9.08
9	$154,574	72	$339	$984	0	0	$1,769	87.40	0.10
		77,686					1,348,383		

Table 1.4.2
UMCS/SCADA OVERALL PROJECT
LIFE-CYCLE COST ANALYSIS SUMMARY

Total Investment	$4,928,020
Energy Discounted Savings	$7,510,137
Non-Energy Discounted Savings	$4,332,335
First Year Dollar Savings	$1,348,383
Simple Payback Period (Years)	3.65
Total Net Discounted Savings	$11,842,470
Savings to Investment Ratio	2.40
Adjusted Internal Rate of Return	12.44%

1.5 DISCUSSION OF RESULTS

The results of the analysis show that for an investment of $4,928,020 Fort Campbell will save $1,348,383 annually with the implementation of the UMCS project. Fort Campbell will recover the investment cost of the project in less than four years.

The UMCS system will give Fort Campbell the capability of having a bird's eye view of its facility and utility systems. This is a very valuable and powerful tool. Through the use of the UMCS/SCADA system, Fort Campbell will be able to manage and operate its facility and utility systems more effectively and efficiently.

1.5.1 Application to HVAC Systems

Heating, ventilating, and air conditioning (HVAC) systems of various facilities can be centrally monitored and controlled. Energy and demand dollars will be saved through temperature setback and scheduled ON and OFF times. The available and easily accessible information will allow Fort Campbell maintenance personnel to implement a more effective preventive maintenance program, reduce service calls, and reduce the overall operations and maintenance costs.

1.5.2 Application to Electrical Systems

The information obtained from electrical load profiles of various feeders, facilities, or individual loads can be used to identify the area of high energy usage concentration and/or possible operation and maintenance problems allowing Fort Campbell to better direct its resources. The electrical demand profile information can be used to coordinate the operation time or sequence of electrical loads in order to limit the electrical demand and save demand dollars. Energy and demand usage data can be automatically retrieved and calculated for billing and accounting purposes, which will save many man-hours and minimize guess work.

1.5.3 Application to Underground Storage Tank Systems

The UMCS/SCADA system is also very effective in the area of hazardous waste management. In this study, the UMCS/SCADA system is utilized to centrally monitor underground storage tanks for fluid levels and for leak detection. The UMCS/SCADA system will reduce the man-hours required to perform on-site monitoring and surveying, and it will also minimize or avoid the costs of cleanup and stiff penalties which would result from a possible leak that could go unnoticed during the non-duty hours.

1.5.4 Application to Other Systems

The SCADA system can also be used to minimize safety hazards by utilizing extensive alarm capabilities for fire detection, security systems, and traffic control monitors.

Perhaps the greatest benefit of the UMCS/SCADA system is that it will help Fort Campbell to manage its response to major accidents, natural disasters, and military threats. The status of the utilities' system can be centrally monitored and controlled, including emergency backup power. The electrical and water system can be isolated and rerouted, as required, for personnel safety and mission operability. The status of critical resources such as water for drinking and fire fighting capability, fuel capacity for missions operability, and electrical utilities for critical facilities can be monitored and managed. This benefit is more than a monetary savings--it also can save lives.

1.6 RECOMMENDATION

In order to fully optimize the benefits of the Utility Monitoring and Control System (UMCS), Systems Corp recommends all of the ECOs in the study be incorporated into a single project. To base the ECOs benefit value solely upon energy savings and tangible monetary return would greatly limit the system's functional capability and defeat the true intent and benefits of the Utility Monitoring and Control System.